



# EASTERN MEDITERRANEAN GAS CONFERENCE

10 – 12 March 2014 | Hilton Tel Aviv — Tel Aviv, Israel

 **noble  
energy**



Linklaters





# *Sea NG Alliance*

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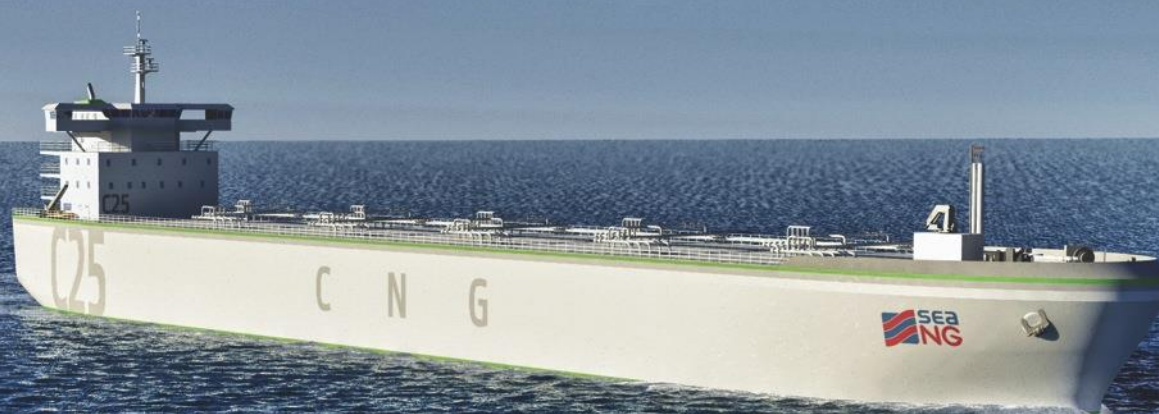
## *DELIVERS NATURAL GAS*

# Marine CNG Transportation

2014 Eastern Mediterranean Gas Conference

Tel Aviv, Israel

11-12 March 2014





Technology and  
Project Developer

Owns all rights to patented  
Cosell® System



Finance and  
Resource Mobilization

*US\$50 billion in assets with  
5,680 employees*



Ship Construction  
and Operations

*US\$10 billion in assets with  
6,100 employees*



Gas Infrastructure  
and Contracting

*US\$49 billion in assets with  
10,000 employees*



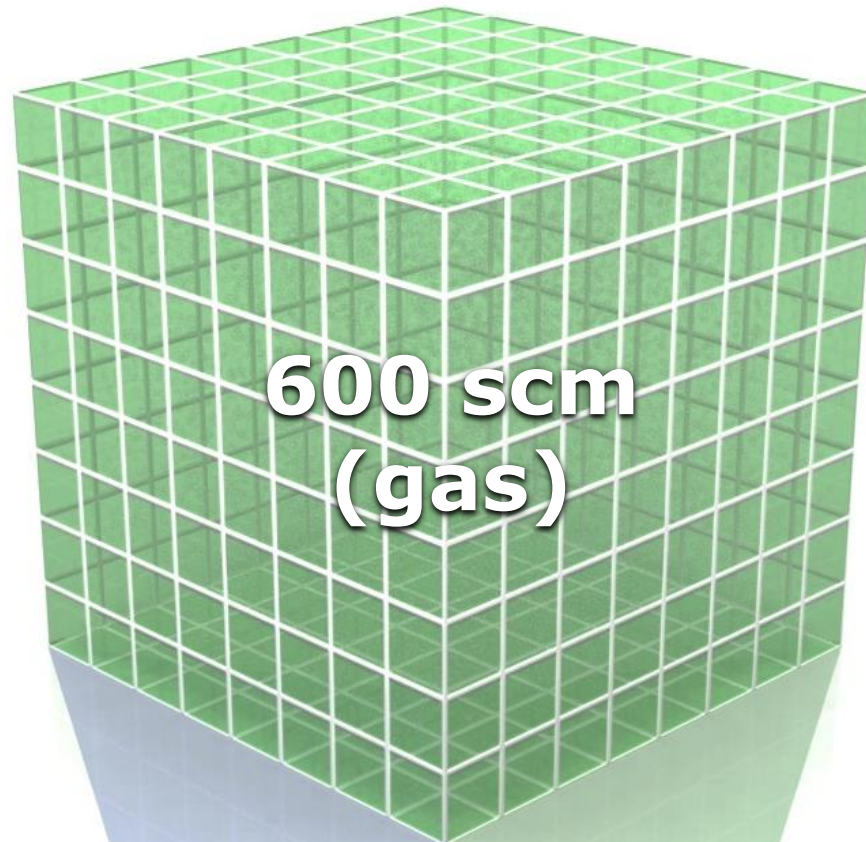


## LNG

**600:1**

**-162 °C**

Ambient  
Pressure



**1 scm**

## CNG

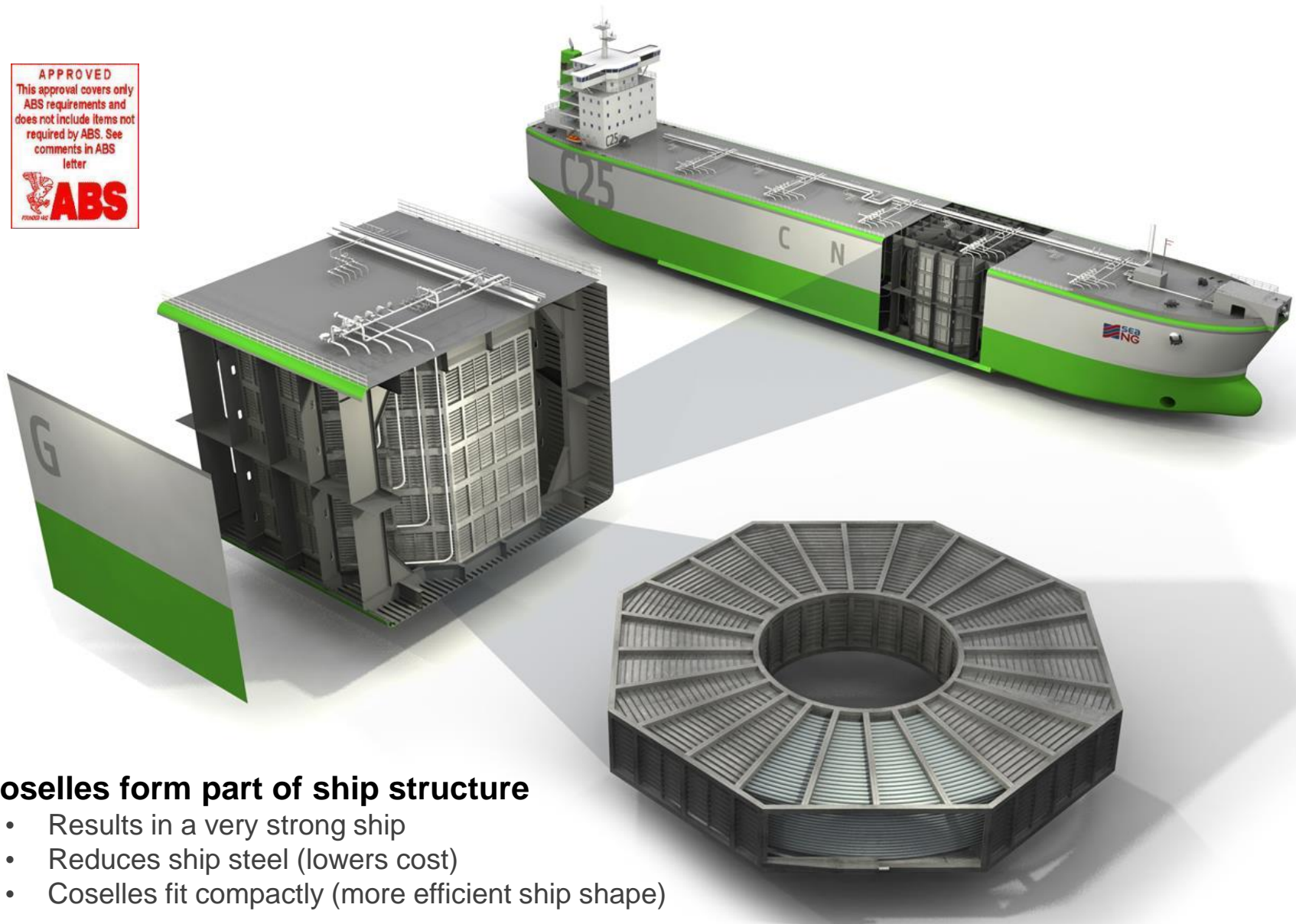
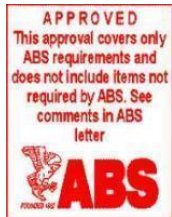
**300:1**

**275 BAR**

Ambient  
Temperature



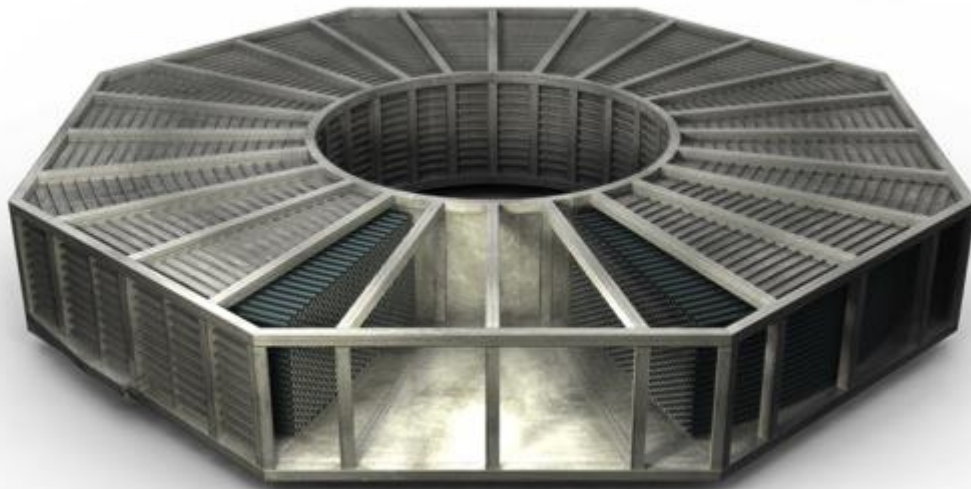
**2 scm**



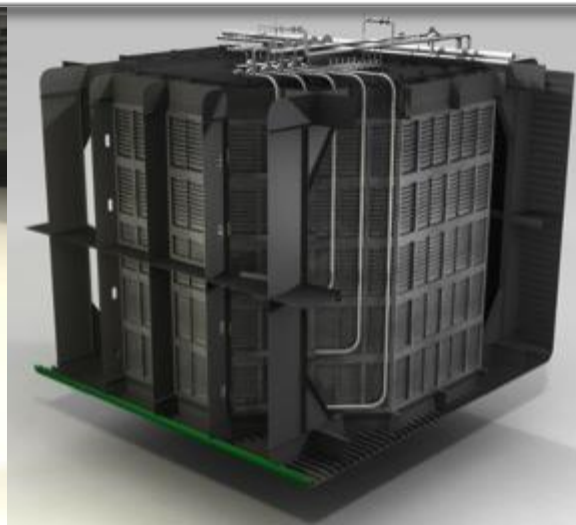
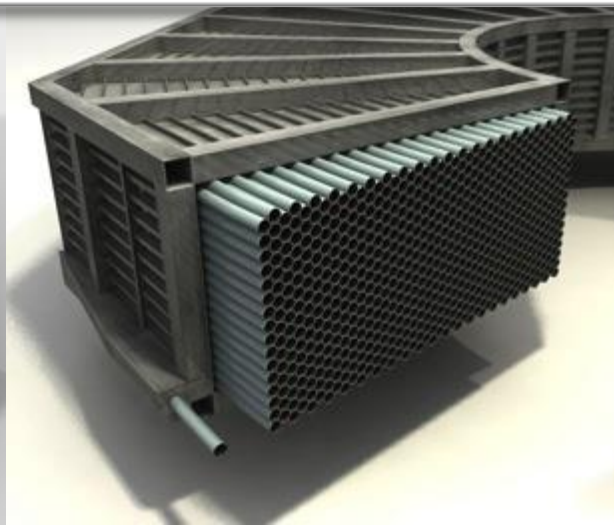
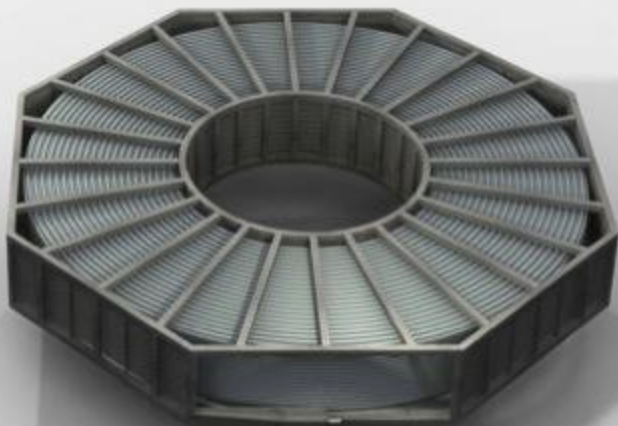
## Coselles form part of ship structure

- Results in a very strong ship
- Reduces ship steel (lowers cost)
- Coselles fit compactly (more efficient ship shape)

# Coselle® dimensions and capacity



Coselle Capacity	4.2 mmscf ~ 120,000 scm ~ 82 t
Pressure	4000 psi / 275 bar 80 °F / 27 °C
Pipe Size	OD = 168 mm wt = 6.35 mm
Pipe length	21,350 m
Outer Diameter	20.5 m
Inner Diameter	9 m
Height	3.1 m
Weight (empty)	630 mt
Steel	X80 ERW





Fully tested and fully approved



A decade of research,  
engineering and testing resulted  
in full approval at an operating  
pressure of 275 bar (4000 psi).

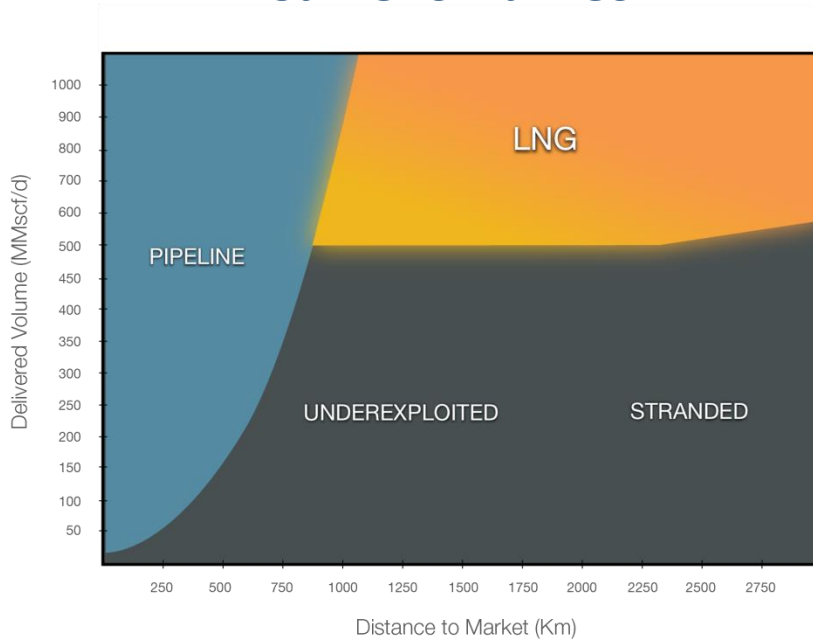
# ABS APPROVED

Met or exceeded all ABS  
requirements. Critical fatigue  
testing exceeded requirements  
by 300% without failure (65,000  
cycles).

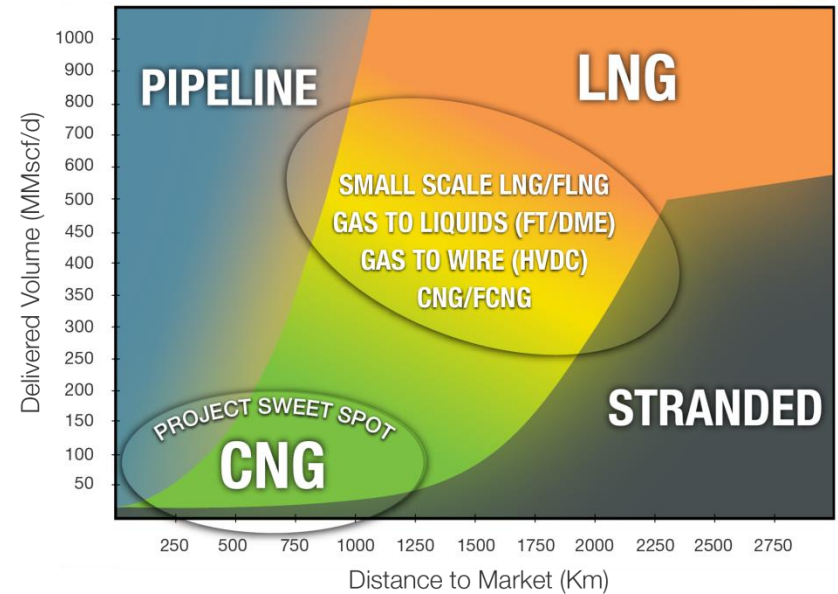




## Current Market



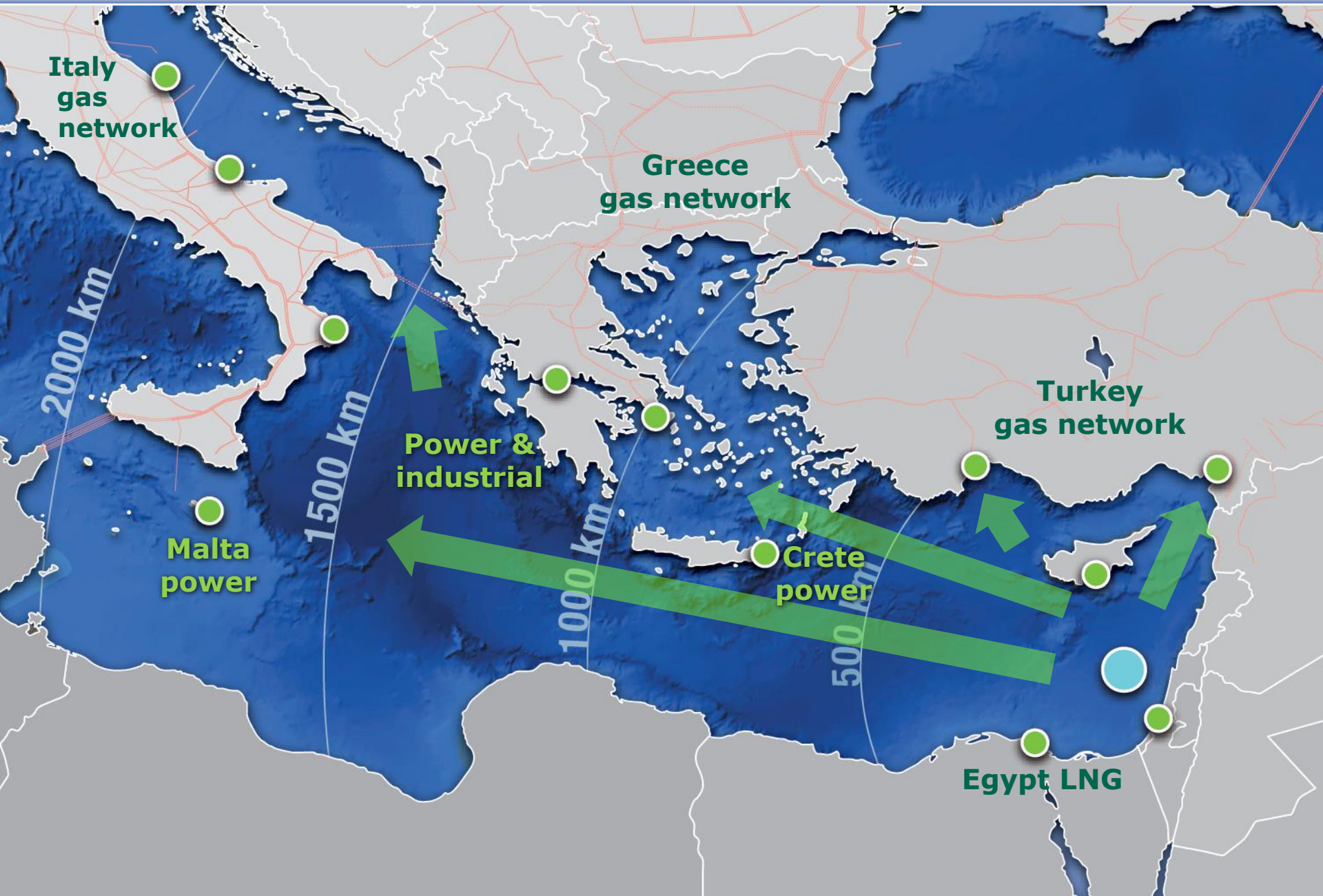
## Regional Niche for CNG



DRIVERS	PRODUCERS	CONSUMERS
<b>ECONOMIC</b>	Capture/enhance value of gas reserves	Lower energy cost
<b>ENVIRONMENTAL</b>	Reduce flaring	Reduce CO <sub>2</sub> emissions



# Marine CNG opportunities in Eastern Mediterranean





## Case A: CNG vs. LNG European regional market

Volume of 300 mmscf/d (3 bcm/a)		
Distance (1000 km)		
	<b>CNG (regional)</b>	<b>LNG (regional)</b>
<b>Cost of gas at destination market (US\$/mmBtu)</b>	<b>11.6</b>	<b>11.6</b>
Loading or liquefaction	0.6	5.5
Transportation by CNG or LNG	2.6	1
Off-loading or regasification	0.15	1
<b>Net-back (US\$/mmBtu)</b>	<b>8.25</b>	<b>4.1</b>



## Case B: CNG regional market and LNG global market

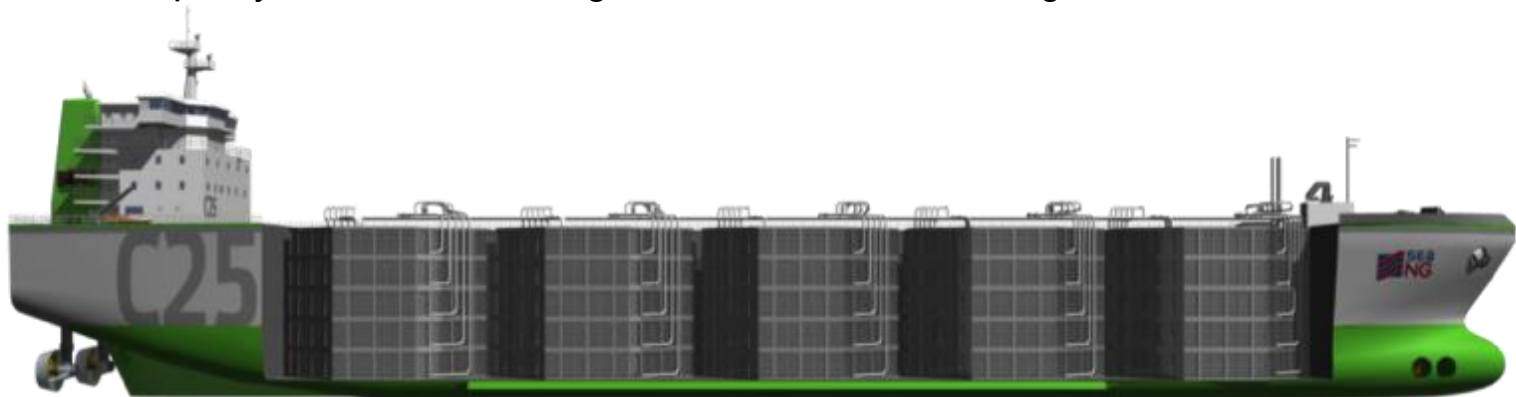
Incremental volume: 300 mmscf/d (3 bcm/a)		
Distance: 1000 km for CNG and Japan for LNG		
	CNG (Europe)	LNG (Japan)
<b>Cost of gas at destination market (US\$/mmBtu)</b>	<b>11.6</b>	<b>17</b>
Loading or liquefaction	0.6	5.5
Transportation by CNG or LNG	2.6	2
Off-loading or regasification	0.15	1
<b>Net-back (US\$/mmBtu)</b>	<b>8.25</b>	<b>8.5</b>





Ship	C16	C20	C25	C30	C36	C42	C48	C84	C112
Coselles	16	20	25	30	36	42	48	84	112
Net Capacity* (million scf)	66	82	103	123	148	172	197	344	459
(million scm)	1.9	2.3	2.9	3.5	4.2	4.9	5.6	9.8	13.0
Length OA (m)	153	153	178	203.8	207.5	233	258.4	267.1	290.4
Breadth (m)	26.5	26.5	26.5	26.5	28.5	28.5	28.5	47.2	47.2
Depth (m)	14.9	18	18	18	21.8	21.8	21.8	27.5	30.6
Loaded Draft (m)	5.5	6.7	6.5	7.2	8.1	8.1	8.2	8.8	10.4

\* Net capacity is net of heel gas and assumes lean gas at 27°C





- **Simple**

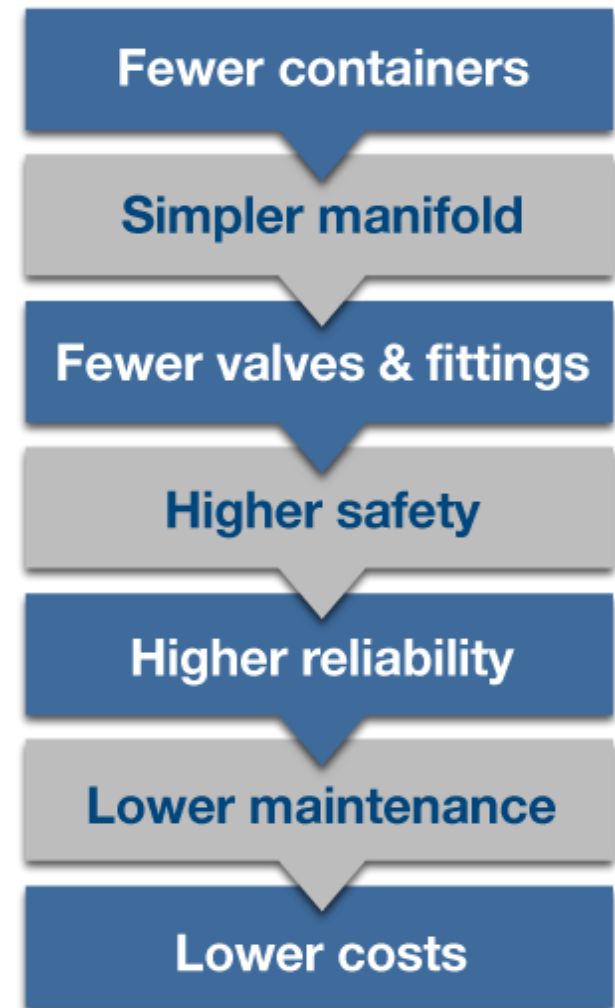
- Utilizes few large Coselle® versus hundreds or thousands of bottles
- 10-20 times fewer connections

- **Safe**

- Coselle® is a matrix of steel
- Small diameter design assures safety
- Nitrogen sealed Coselle® are stacked within a nitrogen sealed cargo hold
- Fully approved by classification societies

- **Lower cost**

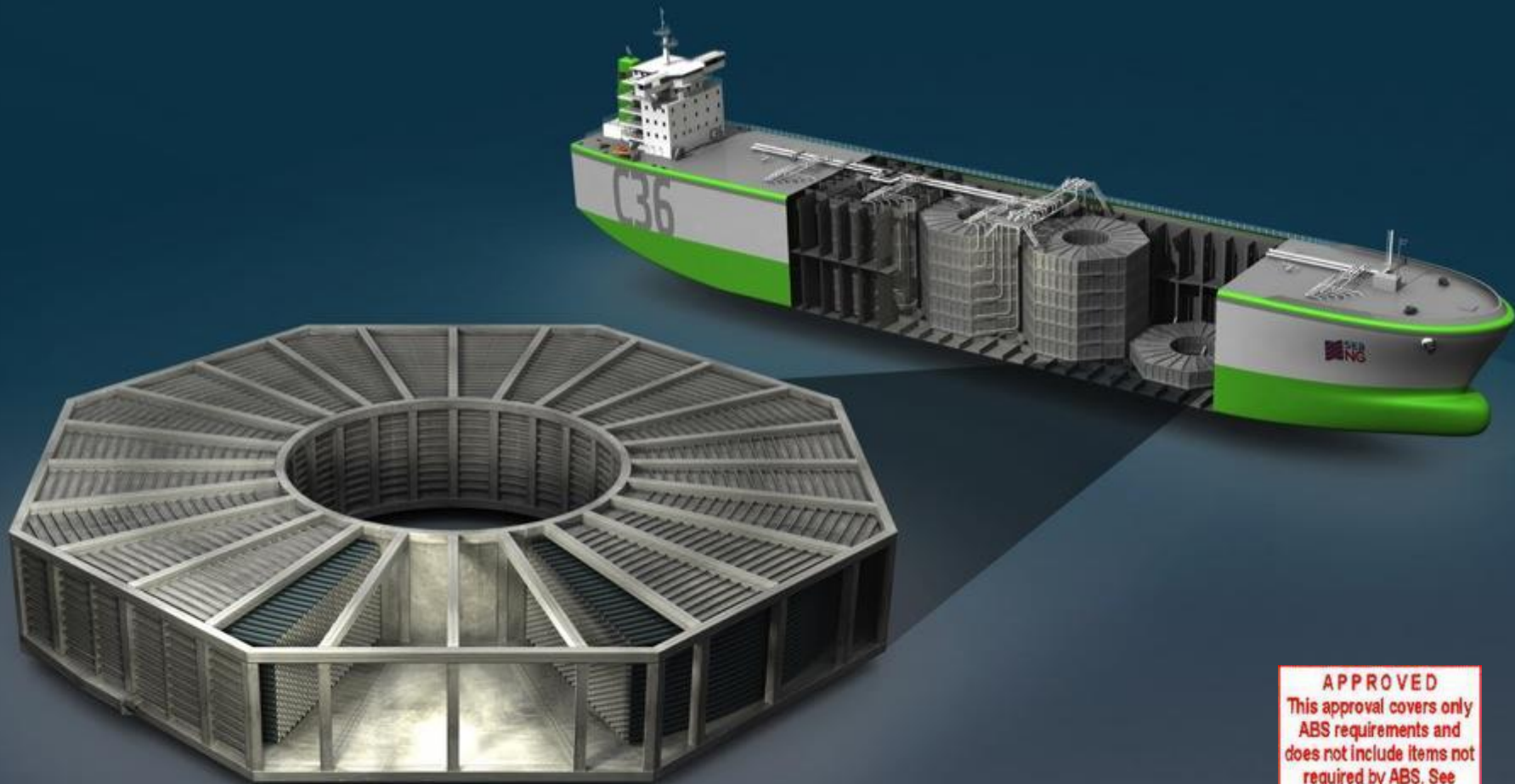
- Utilizes standard compression equipment
- Patented manifold enables efficient and cost-effective loading and discharge
- Readily available ERW X80 pipe is faster and cheaper to manufacture



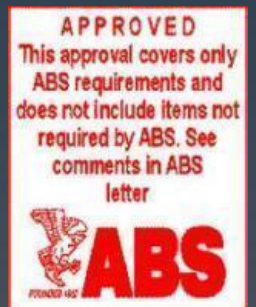


- Flexible solution delivering higher net-backs in regional markets
- Takes advantage of lower cost of regional gas
- Fast implementation - first gas in 26 months from FID
- No capital required from client, only a “take-or-pay” tariff for the contracted volume and term
- Flexibility to redeploy the assets for smaller offshore reserves
- Complementary to LNG, pipeline and liquid fuels
- Small footprint for loading/unloading facilities
- Sea NG Alliance has strong financial and operational capability – Ready to contract for service





✧ A1 Compressed Natural Gas Carrier





## **Sea NG Corporation**

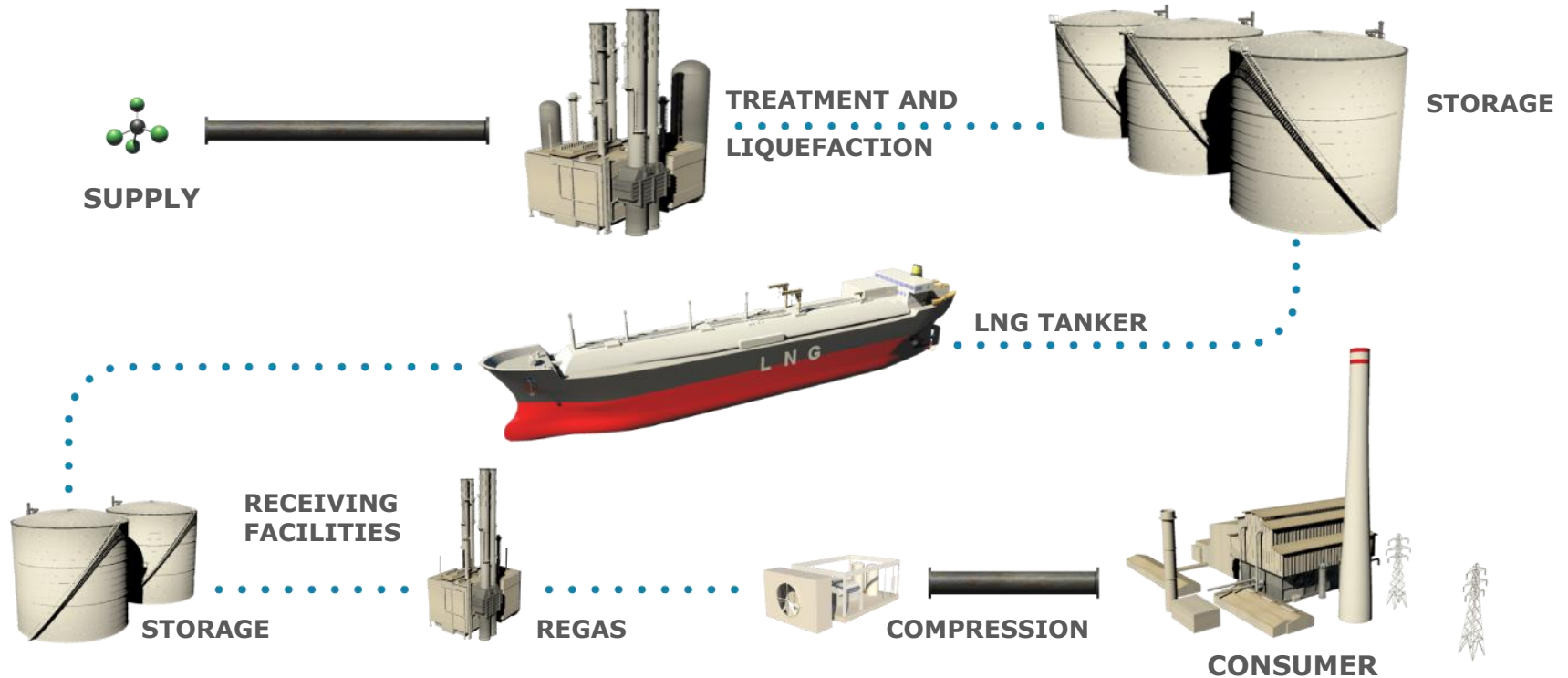
Suite 750, 101-6<sup>th</sup> Avenue SW  
Calgary, Alberta, T2P 3P4, Canada

[www.sea-ng.com](http://www.sea-ng.com)

### **Adam Hedayat,**

Vice President, Business Development  
[ahedayat@sea-ng.com](mailto:ahedayat@sea-ng.com)

Loading: Gas treatment, liquefaction and storage  
Terminals: Onshore in harbor / offshore liquefaction  
Ships: Sophisticated, efficient  
Receiving: Storage, regasification, harbor / offshore regas





- Loading: Dehydration, compression
- Terminals: Onshore or offshore (buoy/platform)
- Ships: Simple – shuttle carriers
- Receiving: Decompression and connection to customer

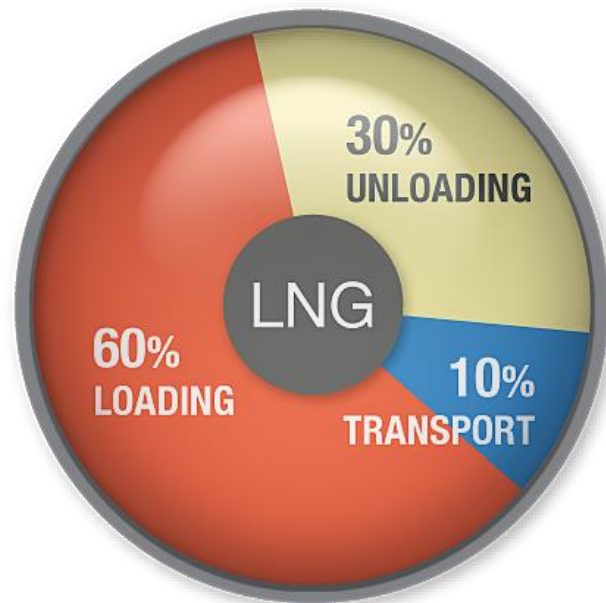




Investment: Loading, Transportation and Unloading

LNG: 90% of cost in shore facilities

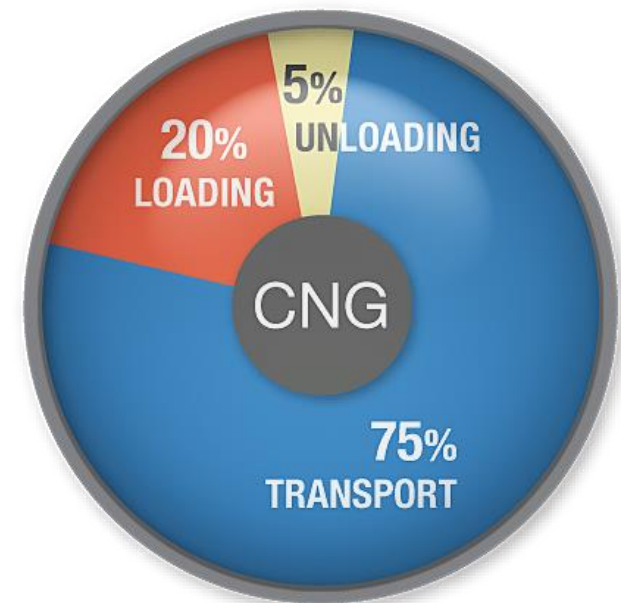
CNG: 25% of cost in shore facilities



LOADING

TRANSPORT

UNLOADING





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